

Aquarium Designer

Performance Task

Introduction

As a new designer with a background in aquatic habitats, you want to win over the design and production team of the hottest new interior design firm in the northeast United States. They want to hire someone who will add creativity and innovation to their production and design team. In order to be hired, you will have to create a model of a unique aquarium that can be maintained in a residential home or a commercial facility. You will also need to estimate the cost to create the full-size tank. You will also be asked to create various aquarium designs for which a specific volume has been requested by the consumers.

Big Idea / Essential Questions

Big Idea

Geometric relationships can be described, analyzed, and classified based on spatial reasoning and/or visualization.

Technological design is a creative process that anyone can do which may result in new innovations and inventions.

A technological world requires that people develop capabilities in order to solve technological challenges and to improve products for the way we live.

Essential Questions

- How can we use 2-D and 3-D shapes and attributes to describe real world situations and solve problems?
- How are spatial relationships, including shape and dimension, used to draw, construct, model, and represent real situations or solve problems?
- How would you apply technological design and problem-solving methods to the development of inventions and innovations?

G.R.A.S.P.

Goal

You are interviewing for a position at a new interior design firm. There has been an increase in requests for specialized home aquariums and the firm wants to hire more designers to meet this need. Your goal is to design and present your best, most creative aquarium design. The firm is very proud of its reputation for providing great products at good prices through a design process that precisely meets the needs of its clients.

Role

You have just graduated from college with a degree in interior design. You are looking for a job that is creative and innovative while challenging your skills. You have background experience as an aquatic assistant specializing in exotic aquarium pets. As a result, you have a strong understanding of, and an interest in, aquatic life.

Audience

You will be presenting to the design and production team for the design firm. They are looking to hire people who can show innovative and creative ideas related to aquarium design. They will also need to see that you can use math and science concepts to create products that meet customer needs at a good price.

Situation

As a new designer with a background in aquatic habitats, you will need to win over the design and production team of the hottest new interior design firm in the northeast United States. In order to be hired, you will have to create a model of a unique aquarium that can be maintained in a residential home or a commercial facility. You will also need to provide an estimate of the cost to create the full-size tank. Additionally, you will be asked to create alternate aquarium designs with the same volume as your model. As you design the aquariums, consider the cost of the materials you will need to build them.

- Simulation: [Aquarium Designer](#)

*Please note the above simulation is not compatible with tablets or other mobile devices.

Habitats:

[Freshwater Fish Habitats](#)

[Saltwater Fish Habitats](#)

Products

1. Cost Analysis

Your team will need to decide what materials you will need to create your aquarium and what you will need to buy to put inside. Research different types of fish and the items you will need inside to make their ecosystem perfect for the fish. What types of food will you buy? Will you need a heater/cooler or a light for the fish tank? What kind of filter will you use?

Once you have decided, create a chart or spreadsheet of all of the different items you will need for your aquarium. Research the price for each and list it in the chart. Determine how many of the materials and fish you will need to buy and the price of each as well as your total aquarium cost. Be sure that your chart is neat and clear to make it easy to read.

- What materials are needed to design an aquarium?
- What fish and habitat materials will go inside your aquarium?
- What is the total cost of all the items needed for an aquarium?

Cost Analysis - Aquarium Designer

Achievement Levels	1	2	3	4
Spreadsheet (x1)	The data collected is not very organized in a chart or spreadsheet. It has incorrect units or labels.	The data collected is somewhat organized in a chart or spreadsheet. It has some correct units and labels.	The data collected is organized in a chart or spreadsheet. It has correct units and labels that help the viewer to understand.	The data collected is very organized in a neat, easy to read chart or spreadsheet. It has correct units and labels that help the viewer to understand.
Research (x1)	Product shows that little research was conducted around the topic.	Product shows that some research was conducted around the topic.	Product shows that research was conducted around the topic.	Product shows that thorough research was conducted around the topic.
Decimal Operations (x1)	Product shows little correct work and solutions when performing operations with decimals.	Product shows some correct work and solutions when performing operations with decimals.	Product shows most correct work and solutions when performing operations with decimals.	Product shows all correct work and solutions when performing operations with decimals.
Cost Efficiency (x1)	Product shows minimal use of critical thinking in an attempt to identify cost efficient materials that will create a high quality aquarium and environment.	Product shows some use of critical thinking to identify somewhat cost efficient materials that will create a high quality aquarium and environment.	Product shows sufficient use of critical thinking to identify cost efficient materials that will create a high quality aquarium and environment.	Product shows strong use of critical thinking to identify the most cost efficient materials that will create a high quality aquarium and environment.
Multiplying Fluently (x1)	Few multiplication calculations are correctly shown using an appropriate algorithm.	Some multiplication calculations are correctly shown using an appropriate algorithm.	Most multiplication calculations are correctly shown using an appropriate algorithm.	All multiplication calculations are correctly shown using an appropriate algorithm.

2. Two Dimensional Drawing With Narrative Description

Design at least 3 different aquariums to be presented to the team. Each design should be developed by providing a scale drawing of the tank labeled with all dimensions (height, length, width, volume) as well as a paragraph explaining the unique features of the tank and how the volume of the tank was determined.

- What are some typical aquarium designs? Are there any particular shapes or sizes?
- What dimensions and volume will your aquarium be?
- What other math will you need to do in order to create your best design?

Two Dimensional Drawing - Aquarium Designer

Achievement Levels	1	2	3	4
Informational Writing (x1)	Written description is a minimal explanation of the important points about the new aquarium design.	Written description is a partial explanation of the important points about the new aquarium design supported by some facts and details.	Written description is an adequate explanation of the important points about the new aquarium design supported by facts and details.	Written description is a thorough explanation of the important points about the new aquarium design supported by facts and details.
Labels (x1)	Few items that need to be identified have a label.	Some items that need to be identified have a label.	Most items that need to be identified have a label.	Every item that needs to be identified has a label.
Scale Drawing (x1)	Product is an inaccurate scale drawing.	Product is a very basic scale drawing with the potential to represent some actual measurements.	Product provides a scale drawing that uses some accurate measurements.	Product is an excellent scale drawing that can be used to represent actual measurements.

Achievement Levels	1	2	3	4
Volume (x1)	Product demonstrates minimal understanding of the concept of volume through inaccurate representation and calculations.	Product demonstrates some understanding of the concept of volume through partially accurate representation and calculations.	Product demonstrates adequate understanding of the concept of volume through mostly accurate representation and calculations.	Product demonstrates thorough understanding of the concept of volume through accurate representation and calculations.
Math Practices in the Design Process (x1)	The product demonstrates minimal understanding of how math is connected to the design process through little use of the mathematical practices.	The product demonstrates some understanding of how math is connected to the design process through some use of the mathematical practices.	The product demonstrates understanding of how math is connected to the design process through use of the mathematical practices.	The product demonstrates strong understanding of how math is connected to the design process through excellent use of the mathematical practices.
Volume and the Design Problem (x1)	Little explanation given about the volume of the aquarium(s) and its importance in relation to the animals that will live there.	Partial explanation given about the volume of the aquarium(s) and its importance in relation to the animals that will live there.	Adequate explanation given about the volume of the aquarium(s) and its importance in relation to the animals that will live there.	Clear, thorough explanation given about the volume of the aquarium(s) and its importance in relation to the animals that will live there.
Research (x1)	Product shows that little research was conducted around the topic.	Product shows that some research was conducted around the topic.	Product shows that research was conducted around the topic.	Product shows that thorough research was conducted around the topic.

3. Presentation

Develop a two to three minute oral presentation that may include the use of technologies such as PowerPoint, Keynote, or any other technology you wish to use. This presentation should include the sample design and the volume of the aquarium. Describe the type of habitat and fish that could be contained within the aquarium design.

Keep in mind that the audience for this presentation is the design team and your chances of getting the job depend on your performance. This is a persuasive presentation so be sure to include how your design will minimize stress on the fish in the aquarium.

- What kind of design will you use for your aquarium?
- What materials will you use to build your design?
- What fish and habitat materials will go inside your aquarium?

Oral Presentation - Aquarium Designer

Achievement Levels	1	2	3	4
Focus (x1)	The purpose of the presentation is minimally explained in the introduction and little content connects to the topic.	The purpose of the presentation is partially explained in the introduction and some content connects to the topic.	The purpose of the presentation is explained in the introduction and most content connects to the topic.	The purpose of the presentation is explained in the introduction and all content connects to the topic.
Engineering Design (x1)	Product demonstrates little understanding of the criteria and constraints of the design problem with regard to size and materials of the product.	Product demonstrates some understanding of the criteria and constraints of the design problem with regard to size and materials of the product.	Product demonstrates understanding of the criteria and constraints of the design problem with regard to size and materials of the product.	Product demonstrates strong understanding of the criteria and constraints of the design problem with regard to size and materials of the product.
Research	Product shows that little research was conducted	Product shows that some research was conducted	Product shows that research was conducted around the	Product shows that thorough research was conducted

Achievement Levels	1	2	3	4
Volume and the Design Problem (x1)	Little explanation given about the volume of the aquarium(s) and its importance in relation to the animals that will live there.	Partial explanation given about the volume of the aquarium(s) and its importance in relation to the animals that will live there.	Adequate explanation given about the volume of the aquarium(s) and its importance in relation to the animals that will live there.	Clear, thorough explanation given about the volume of the aquarium(s) and its importance in relation to the animals that will live there.
Volume (x1)	Product demonstrates minimal understanding of the concept of volume through inaccurate representation and calculations.	Product demonstrates some understanding of the concept of volume through partially accurate representation and calculations.	Product demonstrates adequate understanding of the concept of volume through mostly accurate representation and calculations.	Product demonstrates thorough understanding of the concept of volume through accurate representation and calculations.
Organisms and Habitats (x1)	Product shows little understanding that living things depend on their habitats to meet their basic needs.	Product shows some understanding that living things depend on their habitats to meet their basic needs.	Product shows a sufficient understanding that living things depend on their habitats to meet their basic needs.	Product shows a thorough understanding that living things depend on their habitats to meet their basic needs.
Delivery (x1)	Presenter makes eye contact and has good posture and volume throughout little of the presentation.	Presenter makes eye contact and has good posture and volume throughout parts of the presentation.	Presenter makes eye contact and has good posture and volume throughout most of the presentation.	Presenter makes eye contact and has good posture and volume throughout the whole presentation.

4. Photostory

Create a slide show using technology to display a variety of aquariums from around the world. Research the sizes of these aquariums and present through captions the dimensions of each and the potential volume of water that each could hold. For each aquarium, provide an example of a fish and a plant that could live in each aquarium. Include the amount of room they would need to live adequately and grow and how they would meet their basic needs.

- What kinds of aquariums are used around the world?
- What kinds of fish are the best for each kind of aquarium and why?
- What are the dimensions and volume for the aquariums?

Photostory - Aquarium Designer

Achievement Levels	1	2	3	4
Captions (x1)	Few photos contain a caption that provides the necessary details.	Some photos contain a caption that provides the necessary details.	Most photos contain a caption that provides the necessary details.	Every photo contains a caption that provides the necessary details.
Organisms and Habitat (x1)	Product shows little understanding that living things depend on their habitats to meet their basic needs.	Product shows some understanding that living things depend on their habitats to meet their basic needs.	Product shows a sufficient understanding that living things depend on their habitats to meet their basic needs.	Product shows a thorough understanding that living things depend on their habitats to meet their basic needs.
Technology (x1)	The technology used does not add to the presentation. Few graphics are pleasing or support the information given.	The technology used partially adds to the presentation. Some graphics are pleasing and support the information given.	The technology used adds to the presentation. Most graphics are pleasing and support the information given.	The technology used greatly adds to the presentation. All graphics are pleasing and support the information given.
	Little explanation given	Partial explanation given	Adequate explanation given	Clear, thorough explanation

Relate the Design Problem to the Levels	1	2	3	4
(x1)	about the volume of the aquarium(s) and its importance in relation to the animals that will live there.	about the volume of the aquarium(s) and its importance in relation to the animals that will live there.	about the volume of the aquarium(s) and its importance in relation to the animals that will live there.	given about the volume of the aquarium(s) and its importance in relation to the animals that will live there.
Ecological Systems and their Dynamics (x1)	Elements of the aquarium ecosystems are presented with minimal explanation of the interactions between living and non-living parts of the system.	Elements of the aquarium ecosystems are presented with partial explanation of the interactions between living and non-living parts of the system.	Elements of the aquarium ecosystems are clearly presented with adequate explanation of the interactions between living and non-living parts of the system.	Elements of the aquarium ecosystems are clearly presented with thorough explanation of the interactions between living and non-living parts of the system.
Research (x1)	Product shows that little research was conducted around the topic.	Product shows that some research was conducted around the topic.	Product shows that research was conducted around the topic.	Product shows that thorough research was conducted around the topic.

5. Prototype Environment

Create an innovative aquatic environment. This environment should be built based upon a specific volume for your aquarium.

This project could be completed by your entire team. Be sure to create an environment in which the living creatures can survive and thrive. You will need to consider the needs of the fish and other organisms as you design your aquatic habitat. Think about how the fish will be fed and the tank will be cleaned. What other concerns do you need to consider in the development of the aquatic environment?

- What types of fish can thrive and stay healthy in your aquarium and why?
- What do fish need in a habitat?
- What materials will you use for your design?

Prototype - Aquarium Designer

Achievement Levels	1	2	3	4
Prototype (x1)	The prototype is a minimally accurate reproduction of an aquatic environment with little attention to detail.	The prototype is a somewhat accurate reproduction of an aquatic environment with some attention to detail.	The prototype is an accurate reproduction of an aquatic environment with attention to detail.	The prototype is a very accurate reproduction of an aquatic environment with great attention to detail.
Engineering Design (x1)	Product shows minimal understanding of the criteria and constraints of the design problem with regard to size, materials, and function of the product.	Product shows some understanding of the criteria and constraints of the design problem with regard to size, materials, and function of the product.	Product shows adequate understanding of the criteria and constraints of the design problem with regard to size, materials, and function of the product.	Product shows strong understanding of the criteria and constraints of the design problem with regard to size, materials, and function of the product.
Organisms and Habitat (x1)	Product shows little understanding that living things depend on their habitats to meet their basic needs.	Product shows some understanding that living things depend on their habitats to meet their basic needs.	Product shows a sufficient understanding that living things depend on their habitats to meet their basic needs.	Product shows a thorough understanding that living things depend on their habitats to meet their basic needs.
Ecological Systems and their Dynamics (x1)	Elements of the aquarium ecosystems are presented with minimal explanation of the interactions between living and non-living parts of the system.	Elements of the aquarium ecosystems are presented with partial explanation of the interactions between living and non-living parts of the system.	Elements of the aquarium ecosystems are clearly presented with adequate explanation of the interactions between living and non-living parts of the system.	Elements of the aquarium ecosystems are clearly presented with thorough explanation of the interactions between living and non-living parts of the system.

Achievement Volume Design Problem (x1)	1 Little explanation given about the volume of the aquarium(s) and its importance in relation to the animals that will live there.	2 Partial explanation given about the volume of the aquarium(s) and its importance in relation to the animals that will live there.	3 Adequate explanation given about the volume of the aquarium(s) and its importance in relation to the animals that will live there.	4 Clear, thorough explanation given about the volume of the aquarium(s) and its importance in relation to the animals that will live there.
Research (x1)	Product shows that little research was conducted around the topic.	Product shows that some research was conducted around the topic.	Product shows that research was conducted around the topic.	Product shows that thorough research was conducted around the topic.
Volume (x1)	Product demonstrates minimal understanding of the concept of volume through inaccurate representation and calculations.	Product demonstrates some understanding of the concept of volume through partially accurate representation and calculations.	Product demonstrates adequate understanding of the concept of volume through mostly accurate representation and calculations.	Product demonstrates thorough understanding of the concept of volume through accurate representation and calculations.